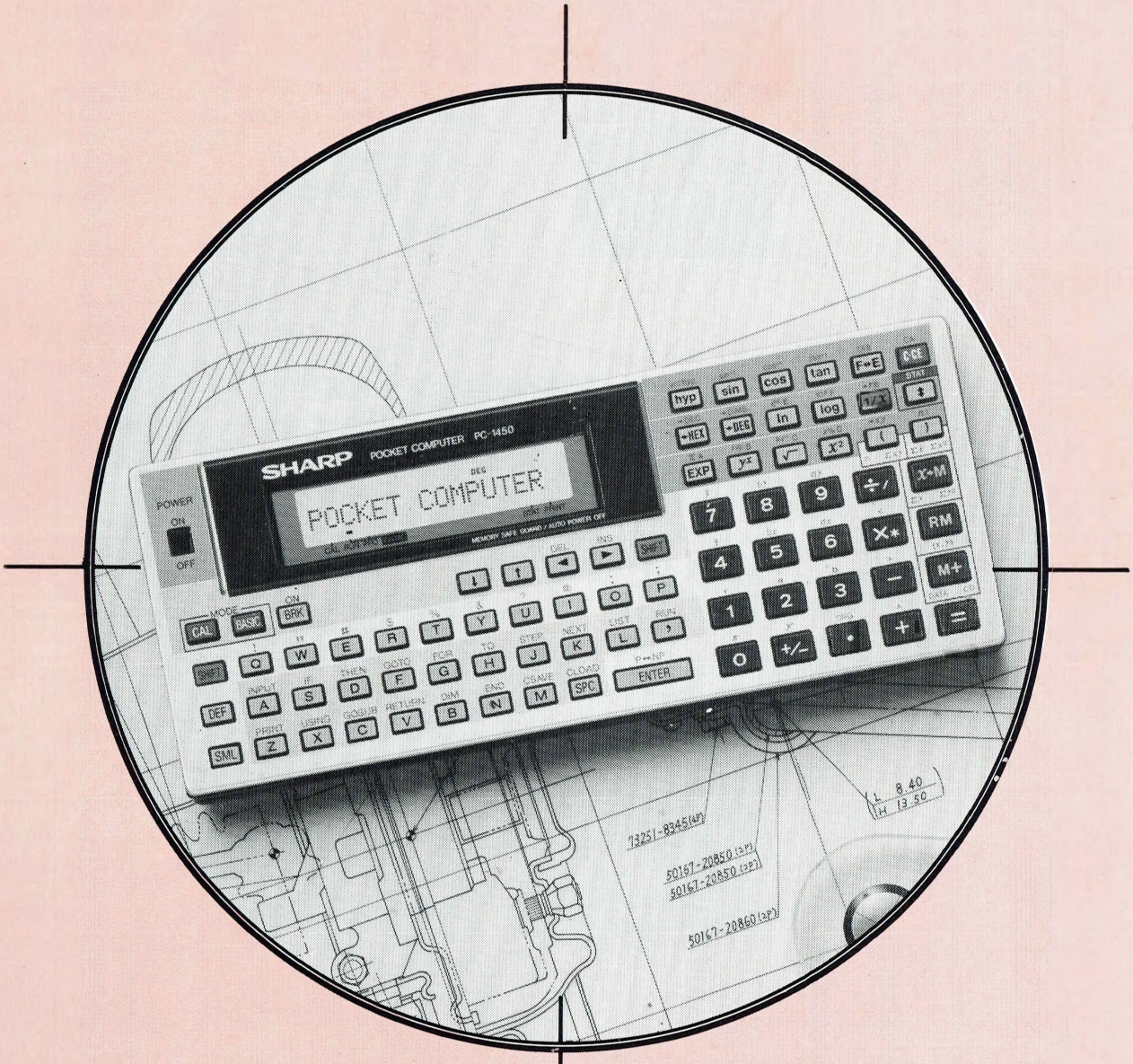
SHARP FOCUS

The Australian Magazine for SHARP Users

Issue No. 7 - January 1986 - $3.50



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- **BIPLANE - A "shoot 'em down" GAME**
- **REVIEW of the PC-1400 SERIES POCKETS**
- **AN ADVENTURE GAME for the MZ-700 and MZ-800**

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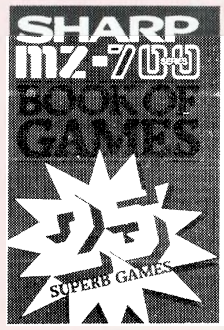

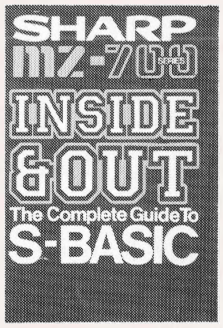

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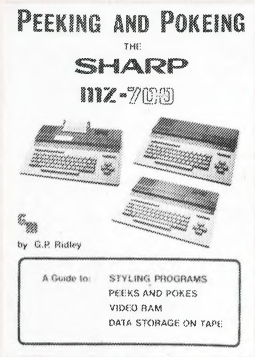

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Ed

MEMORANDUM

To: SHARP FOCUS READERS **Date:** January 1986

From: The Editor

Subject: EDITORIAL

Happy New Year!

One day I might let you into the secret of how we managed to get out this edition of Sharp Focus during the Christmas period. In the meantime, to answer all those people who want more programs to hack in, and to give others something to do during the break, you'll find about half the magazine contains program listings of various kinds.

You'll also find an interesting review on the PC-1400's, including the latest released PC-1450. About 24 hours after this issue was sent to the printer we received the new CE-140P Colour Dot Printer (suitable for the 1350 and 1450) which is capable of printing up to seven colours. A review will follow next month.

MS-DOS is the operating system associated with the larger machines - the PC-7000 for example - and I am currently looking at including specific articles on this subject in the near future.

I am also searching for articles on 'unusual' applications upon which Sharp computers are being used (a couple were mentioned last month). Any information on this subject would be welcome. Which reminds me - have you taken my advice from last month and made the right New Year Resolution?

I have a number of things planned for the magazine in 1986, but like Sharp Corporation, I intend to keep them closely under wraps and deny all rumours! Suffice to say that 1986 looks like being an exciting year for both hardware and this magazine.

Ed

MEMORANDUM

To: SHARP FOCUS READERS **Date:** January 1986

What's your Vector Victor?

Multi-tasking a PC-1500 from Alistair Traylen

This article bears little resemblence to the film from which the above quotation was lifted. In fact the only resemblence is literal. The Word "Vector" may mean little to you at this stage but after consuming a few Bourbon & Cokes and a careful read of the following material, you may grab your soldering iron, ceremoniously burn your SHARP Warranty Card and join the ranks of the elite Multi-tasking PC1500 users.

I must point out although this system is tried and tested it is published for interest only. JME Computer Systems will not be carrying out the below mentioned modifications - do it if you have sufficient expertise.

What is Multi-tasking? If you can consume a glass of Jim Bean and coke while scratching your head you could be defined as Multi-tasking or seeming to perform two functions at once. But are you?

Microprocessor's only appears to perform more than one function at the same time. But by careful programming and the use of interrupts the microprocessor can perform a task in the "Background" while executing another in the "Foreground" with the net result of appearing to perform the tasks simultaneously. Because the CPU (Central Processing Unit) executes its instructions in strict order and very quickly, a means of interrupting the execution of a program and the subsequent execution of another program is required to "Multitask". Nearly all CPU's have this facility including the PC1500's CPU - the SHARP designed 5801. In this implementation I have utilised a feature of the PC1500 that is normally out of bounds to programmers of this machine, because of the way SHARP have coded their operating system in the ROM.

My implementation of the interrupt facility requires a simple modification to the PC1500's Circuit board and I must stress **will null and void all Sharp's warranties.**

Tucked away in the heart of the dear little PC1500's main ROM is the interrupt routine. This little machine code routine is called every time the machine is interrupted. Peripherals utilise this routine to perform functions that require the PC1500 to drop the program that is currently in execution and immediately perform the function required of the peripherals.

As an example, the paper feed button of the CE150 printer is an interrupt driven function, and so too is the CE158 serial port in terminal mode. The interrupts cause a level change on the 5801 I/O port chip's interrupt line and upon sensing this change the current machine code instruction is completed and execution is "VECTORED" (or forced to jump) to the maskable interrupt routine located in the Main ROM. The 5801 CPU has two types of interrupts - Non Maskable and Maskable. The Non maskable is not used at all and the Maskable is used by devices as mentioned above. Maskable simply means the CPU tests the Interrupt register to see if the Interrupt Bit was set. If the bit was set the program execution will be vectored to the maskable interrupt routine. If the bit was not set or reset the CPU will ignore the interrupt request.

The maskable interrupt routine first tries to determine the device that caused the interrupt by reading the PC1500's I/O port controller chip, then if it cannot find the interrupt request flag set, will check the Printers I/O port chip and then the CE158's I/O port chip. (Note all Sharp peripherals use the same I/O port chip - the 5811). The I/O port chips each have their own interrupt line in and a corresponding interrupt output line which connects to the CPU's maskable interrupt pin).

Once the interrupt has been tracked down to the corresponding peripheral, control is passed to a subroutine in that device's ROM. Upon completion control is passed back to the Maskable interrupt subroutine and a return from interrupt instruction is executed. Simple isn't it?

In the case of the Paper Feed, the interrupt is generated when the paper feed key is pressed and the signal is sent via the CE150's I/O port to the PC1500 I/O port and finally to the CPU, which finishes what it was doing then passes control to the maskable interrupt routine. The interrupt routine discovers the interrupt came from the printer and jumps to the CE150's Paper Feed routine which says "Hey, some turkey wants more paper" and advances the paper one

line. The Program execution is returned back to the interrupt routine and the interrupt routine is terminated. Last but not least control is returned to the program that was happily minding its own business before the interrupt was generated. In this case it would be the Basic Interpreter in Manual Mode.

What has this got to do with Multi-tasking you ask? Well this is the basis for it. If there is a way to direct the interrupt to a program we want to execute, then by manipulating the interrupt pin of the CPU we can run two tasks very quickly.

In fact, even whilst the printer is printing a job the CPU can be executing your favourite machine code program in the background every time an interrupt is generated! There are limitations of course but has that ever stopped us on the PC1500 before!

The interrupt can be derived from an oscillator set to pulse every 100th of a second or it may be from a simple switch pulsed every time you wish to jump to your background program.

The main limitation is that the background program must be a machine code program and certain conditions of the PC1500's System environment must be saved in a temporary stack to prevent corruption by the interrupt program.

How can the PC1500 recognise my interrupt?

This little problem nearly caused my brain to hang in an endless loop but I resorted to my favourite cure for such problems and attempted to install a DEC PDP11 inside the PC1500! Well the closest I had at the time to a DEC PDP11 was a well worn stanley knife and in sheer desperation I slashed the interrupt line to the CPU, the theory being, if it won't talk to my interrupt I'd make my device pretend to be the PC1500's I/O port chip.

I won't bore you with the grimey details of the trickery involved in making a stanley knife emulate a DEC PDP11 but merely pass on the fudge factors you must set to make your PC1500 interrupt when you say so.

There is an obscure detail published about the PC1500's interrupt routine in the System ROM and that is, there is provision in the SYSTEM RAM for a vector to an external interrupt routine. This on its own is about as useful as substituting dental floss for solder, but coupled with the following will make your PC1500 do all I claim.

INTERRUPT SOFTWARE

The following program is divided into two parts.

Part one sets up the modified PC1500 to service your interrupt routine.

Part two is an example service routine that adds the contents of a basic variable to the contents of another variable everytime the PC1500 is interrupted. this should prove conclusively that the system really does work. A much expanded routine of this type is the heart of the JME Rally Computer which is an highly accurate navigational aid to the rallying fraternity. (The Computer was proved successful in the 1985 Begonia Rally mentioned in last month's Sharp Focus).

```
;INTERRUPT SERVICE SOURCE CODE
------------------------------------------------------------------------------
; Objective:
; SETUP ORGIN of interrupt processing routine into system Ram
; and trick PC1500 I/O port into thinking it has your device as a SHARP
; Peripheral
; This program may be located anywhere in memory as it is relocatable
; it is presumed it will be called from basic at the start of your Foreground
program
; the orgin is the start address of your interrupt service routine
; this service routine must end with a Return from subroutine instruction
;-------------------PROGRAM PROPER-----------------------
; EQUATES
INTEPORT EQU OFOOAH      ;PC1500 I/O port chip register
INTPORT  EQU OFOOBH      ;  "           "        "
;
ORG   4600H
START:          LDI      A,055H
                LDI      XH,79H
                LDI      XL,0DAH
                SIN      X
                LDI      A,ISERVICE/256 ;HIGH BYTE ORGIN OF USER INTERRUPT
                         ROUTINE
                SIN      X
                LDI      A,ISERVICE-(ISERVICE/256) ;LOW BYTE ORGIN
```

```
                SIN     X
                LDI     A,0CEH
                DB      0FDH
                STA     INTEPORT ;SETUP 5811 INT PORT REGISTERS
                LDI     A,0F4H
                DB      0FDH
                STA     INTPORT
                LDI     A,0F9H
                DB      0FDH
                STA     0B00BH
                SIE             ;ENABLE INTERRUPT
                RTN
; End setup interrupt routine

;-------------------------------------------------------------------------
;INTERRUPT SERVICE ROUTINE
; Objective:
; This program is only executed when an interrupt is detected
; It disables any following interrupts whilst in progress and
; re-enables interrupt on exit
; The program will add the contents of Basic variable M to the contents of V
; and the contents of N to the contents of W every time it is called
; I've used my macro assembler here. See assembled listing for finished result
; The Macro calls are merely time saving ways of using commonly called
; PC1500 system ROM Routines
; The assembled object code shows the actual bytes generated
; --------------------PROGRAM PROPER----------------------------
ISERVICE:       ;PULSE INPUT SENDS PROGRAM HERE
                RIE                     ;STOP INTERRUPT FOR A TICK
                LDI     UL,37H          ;No of Bytes to Save
                LDI     XH,7AH          ;Floating Point registers
                LDI     XL,00H          ;Leading address.
                LDI     YH,TSTACKHIGH   ;HIGH BYTE of my temp STACK
                LDI     YL,TSTACKLOW    ;LOW BYTE of Same
;I've placed the temp stack at the end of this routine
IL1:            TIN
                LOP     UL,IL1          ;SAVE Floating Point Registers
                LDR0    22              ;macro call loads R0 with (V)
                R0TOR2                  ;macro call stores R0 in R2
                LDR0    13              ;macro call loads R0 with (M)
                ADD                     ;macro Call to add R0 & R2
                STR0    22              ;macro call R0 back TO V
                LDR0    23              ;macro call loads W with R0
                R0TOR2                  ;macro call stores R0 in R2
                LDR0    14              ;macro call loads R0 with (N)
                ADD                     ;macro call adds R0 & R2
                STR0    23              ;macro call stores R0 in (W)
ENDI:           LDI     UL,37H          ;Byte count for restore
                LDI     XH,TEMPHIG      ;Leading address Temp Stack
                LDI     XL,TEMPLOW      ;TEMP FP STACK
                LDI     YH,7AH          ;HIGH BYTE Floating Point Registers
                LDI     YL,00           ;LOW of same.
IL2:            TIN
                LOP     UL,IL2          ;Block Move 37H bytes
                SIE                     ;RESET INTERRUPT
                RTN
TSTACK:; Called as TEMPHIGH and TEMPLOW for clarity
                DS 38                   ;38 BYTES FOR TEMP STACK
;
END
```

BIPLANE

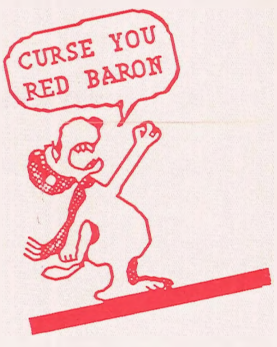
A Game from Gavin and Alan Smith

BIPLANE is a 'shoot em up' (or rather a 'shoot em down) game for aspiring World War 1 Flying Aces. Set in a time when you could see the white of the enemy pilot's eyes as he emerged with guns ablazing from behind a cloud, the object is quite simply to get him before he gets you.

A wave of ten Biplanes attack, and by manipulating the cursor keys to line up your sight (light blue square), you get a chance to eliminate the enemy with the '?' (fire button).

But beware - they are just as anxious to get rid of you and your ammunition is limited. If you sustain more than four hits to your own plane, you'd better hope the parachute works!

```
10 LIMIT$BFFF:UF=0:REM UF=Unfriendl
y
20 GOTO1440
30 PN=0:IFUF=2THENGOTO920
40 DA=0:DE=0:HT=0:AM=3000
50 CONSOLE
60 REM54088
70 DATA197,213,229,211,227,62,7,50,
0,224
80 DATA0,58,1,224,50,32,192,211,225
,225,209,193,201
90 FORA=49152TO49174:READB
100 POKEA,B:NEXTA
110 RESTORE
120 COLOR,,7,1:CLS:E1=53288:E2=5332
7
130 FORA=0TO20:E5=E1+2048:E6=E2+204
8
140 POKEE1,67,30:POKEE2,67:POKE(E1+
2049),33:POKE(E2-1),94:POKE(E2+2047
),33
150 POKEE5,17:POKEE6,17
160 A1=53288:FORAK=1TO8:POKEA1,0,0,
0,0,0
170 POKE(A1+2008),7,7,7,7,7
180 POKE(A1+2048),119,119,119,119,1
19
190 A1=A1+5: NEXTAK
200 E1=E1+40:E2=E2+40
210 NEXTA:HY=0
220 BT=54128:FORA=0TO119:TB=BT+2048
230 POKEBT,67:POKETB,39
240 BT=BT+1:NEXTA
250 GN=54136:POKEGN,86,78:POKE(GN+2
1),77,66
260 PN=PN+1:Q=INT(RND(1)*25):POKE55
795,117
270 IFPN=11THENGOTO1200
280 P=53291+Q:PP=P:YH=0
290 S1=PEEK(P-2):S2=PEEK(P+11)
300 S3=PEEK(P-2):S4=PEEK(P+11)
310 IFS1=67THENP=P+1
320 IFS2=67THENP=P-1
330 IFS3=30THENP=P+1
340 IFS4=94THENP=P-1
350 POKEPP,0,0,0,0,0,0,0,0
360 POKE(PP+40),0,0,0,0,0,0,0,0
370 POKEP,0,95,120,189,120,95,0
380 POKE(P+40),0,31,120,71,120,31,0
390 R=INT(RND(1)*3)
400 PP=P
410 GOTO530
420 BF=INT(RND(1)*7+1)
430 IFBF>4THENGOTO460
440 IFP=53664THENGOTO1270:REM1150 i
s
450 IFP=53624THENGOTO1270:REMreturn
 fire
460 P=P+(39+R)
470 IFP>54087THENGOTO490
480 GOTO290
490 POKEPP,0,0,0,0,0,0,0,0
500 POKE(PP+40),0,0,0,0,0,0,0,0
510 GOTO260
520 END
530 USR($C000):Z=PEEK($C020)
540 IFZ=223THENP=P+40
550 IFZ=239THENP=P-40
560 IFZ=251THENP=P+1
570 IFZ=219THENP=P+41
580 IFZ=215THENP=P+39
590 IFZ=231THENP=P-41
600 IFZ=235THENP=P-39
```



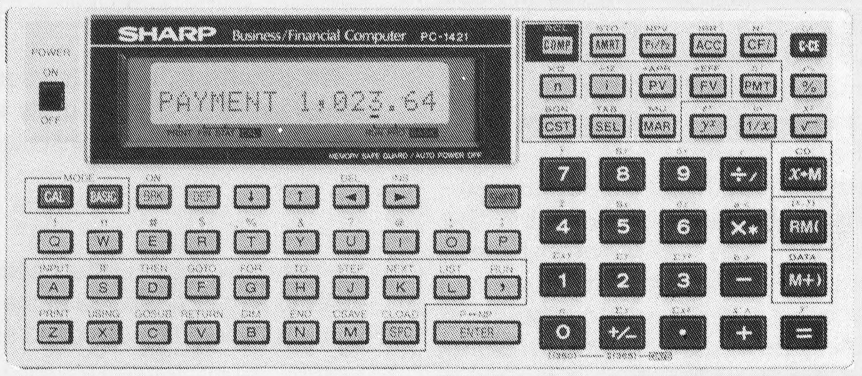
```
610 IFZ=247THENP=P-1
620 IFZ=253THENGOTO740
630 S1=PEEK(P-2):S2=PEEK(P+11)
640 S3=PEEK(P-2):S4=PEEK(P+11)
650 IFS1=67THENP=P+1
660 IFS2=67THENP=P-1
670 IFS3=30THENP=P+1
680 IFS4=94THENP=P-1
690 IFP>54087THENGOTO490
700 IFP<53287THENGOTO1130
710 IFP=PPTHENGOTO420
720 POKE($C020),0
730 GOTO290
740 AM=AM-100:IFAM<90THENGOTO5100
750 B1=54098:B2=54116
760 FORG=1TO9
770 POKEB1,45:POKEB2,89
780 B1=B1-39:B2=B2-41
790 NEXTG
800 TA=PEEK(53747)
810 IFTA>16THENHH=2
820 IFTA=71THENHH=1
830 B1=54098:B2=54116
840 FORG1=1TO30:NEXTG1:FORG=1TO10
850 POKEB1,0:POKEB2,0
860 B1=B1-39:B2=B2-41
870 NEXTG:IFHH=1THENGOTO930
880 IFHH=2THENGOTO1040:GOTO420
890 REM SIGHT at 53747
900 GOTO420
910 GOTO420
920 CLS:PRINT"SORRY"
930 HH=0:CURSOR0,0:DE=DE+1
940 PRINT[0,7]TAB(3) "DESTROYED";DE
;"  HITS";DA;"           "
950 PRINT
960 POKEP,0,96,165,166,165,0,0,0
970 POKE(P-40),249,250,255,249
980 POKE(P+40),0,0,166,165,166,0,0
990 FOREX=1TO20:NEXTEX:GOSUB1890
1000 POKEP,0,0,0,0,0,0,0,0,0
1010 POKE(P-40),0,0,0,0,0,0,0,0,0
1020 POKE(P+40),0,0,0,0,0,0,0,0,0,0
1030 FOREX=1TO200:NEXTEX:GOTO260
1040 HH=0:CURSOR0,0: DA=DA+1:YH=YH+
1
1050 IFYH<4THENGOTO1070
1060 IFYH=4THENGOTO1100
1070 PRINT[0,7]TAB(3)"DESTROYED";DE
;"       HITS";DA;"    "
1080 PRINT
1090 GOTO420
1100 PRINT[0,7]"■ FOUR HITS PLANE D
ESTROYED        ":DA=DA-4
1110 FORTT=0TO800:NEXTTT
1120 PRINT"■
                ":GOTO930
1130 POKEP,0,0,0,0,0,0,0,0
1140 POKE(P+80),0,0,0,0,0,0,0,0
1150 POKE(P+40),0,0,0,0,0,0,0,0
1160 CURSOR1,0
1170 PRINT[7,0]TAB(3)"    YOU LOST T
HE TARGET"
1180 MUSIC"CDBEDADDBAGE":PRINT"■

 ":GOTO490
1190 CLS:PRINT:PRINT"  YOU HAVE USE
D UP ALL YOUR AMUNITION  "
1200 CLS:PRINT:PRINT
1210 PRINT" YOU SHOT DOWN ";DE;" PL
ANES OUT OF 10"
1220 PRINT:PRINT"     YOU SCORED ";D
A;" HITS"
1230 PRINT:PRINT" YOU SUFFERED ";HT
;" HITS"
1240 PRINT:PRINT"      AMUNITION LEF
T ";AM;" ROUNDS    "
1250 COLOR,,7,1
1260 FORNG=1TO1000:NEXTNG:UF=UF+1:G
OTO20
1270 M1=53746:M2=53748
1280 FOR M=1TO8
1290 POKEM1,46:POKEM2,46
1300 M1=M1+39:M2=M2+41
1310 NEXTM
1320 FORFB=1TO30:NEXTFB
1330 FB=INT(RND(1)*5+1):REM Have yo
u been hit
1340 M1=53746:M2=53748
1350 FOR M=1TO8
1360 POKEM1,0:POKEM2,0
1370 M1=M1+39:M2=M2+41
1380 NEXTM
1390 IFFB>2THENGOTO1410
1400 GOTO460
1410 PRINTTAB(2)"■YOU HAVE BEEN HIT
 ";(HT+1) ;" TIMES ":MUSIC"EDFCGBEA
ADCBGEAA":TEMPO6
1420 HT=HT+1:IFHT=5THENGOTO1780
1430 GOTO460
1440 COLOR,,7,1:CLS
1450 XX=53448
1460 FORYY=1TO30:FORYZ=1TO30:NEXTYZ
1470 AA=XX:BB=XX+40:CC=XX+80:DD=XX+
120
1480 EE=XX+160:FF=XX+200:GG=XX+240
1490 POKEAA,0,0,0,0,0,0,77,0,0,0
1500 POKEBB,0,0,0,0,0,0,67,0,0,0
1510 POKECC,0,127,77,0,0,78,67,0,0
1520 POKEDD,0,120,68,67,67,67,74,68
,49,0
1530 POKEEE,0,127,86,0,0,66,67,0,0,
```

```
0
1540 POKEFF,0,0,0,0,0,0,67,0,0,0
1550 POKEGG,0,0,0,0,0,0,86,0,0,0
1560 XX=XX+1
1570 NEXTYY
1580 CLS:PRINT:PRINT:PRINT:PRINT
1590 PRINT"  [graphics]
[graphics]"
1600 PRINT"  [graphics]
  [graphics]  "
1610 PRINT"  [graphics]
[graphics]  "
1620 PRINT"  [graphics]
  [graphics]  "
1630 PRINT"  [graphics]
  [graphics]  "
1640 PRINT"  [graphics]
  [graphics]"
1650 PRINT:PRINT"     By GAVIN & ALA
N SMITH"
1660 PRINT:MUSIC"AC#CDEB2AGACDEGBGB
CADEFFCEABGAACCDCDEAGE":TEMPO6
1670 FORAA=0TO50:NEXTAA
1680 CLS:PRINT:PRINT:PRINT
1690 PRINT"   YOU HAVE TO SHOOT DOW
N AS MANY OF  "
1700 PRINT:PRINT"   THE TEN BI-PLAN
ES THAT ATTACK YOU. "
1710 PRINT:PRINT"   YOU ALTER YOUR
DIRECTION WITH THE  "
1720 PRINT:PRINT"   CURSOR KEYS AND
 FIRE WITH THE'?'KEY."
1730 PRINT:PRINT"   YOUR SIGHT IS T
HE LIGHT BLUE SQUARE."
1740 PRINT:PRINT"     YOU HAVE LIMI
TED AMUNITION    "
1750 PRINT:PRINT "        DO NOT WA
STE IT"
1760 FORAA=1TO200:NEXTAA:MUSIC"GGBB
CCDDEEAABAGAFFFBGEADCEDAGBADEECBCBG
":GOTO30
1770 CLS:COLOR,,7,2
1780 CLS:COLOR,,7,2
1790 PRINT:PRINT:PRINT:PRINT:PRINT:
PRINT:PRINT
1800 PRINT:PRINTTAB(13)"YOU ARE ON
FIRE"
1810 PRINT:PRINTTAB(16)"BAIL OUT"
1820 PRINT
1830 PRINT" YOU SHOT DOWN ";DE;" PL
ANES OUT OF 10 "
1840 PRINT:PRINT"       YOU SCORED
";DA;" HITS          "
1850 PRINT:PRINT"       YOU SUFFERED
 ";HT;" HITS          "
1860 PRINT"    FIVE HITS AND YOU AR
E SHOT DOWN    "
1870 FORNG=1TO2000:NEXTNG:GOTO20
1880 :END
1890 EF=53420:FE=53460:OF=EF+80
1900 FORBI=1TO8
1910 POKE(OF-34),0,0,0,208,208,0
1920 POKE(OF+2017),33,33
1930 POKE(FE+2137),33,33
1940 POKE(FE+2177),33,33
1950 POKE(FE+2217),33,33
1960 POKE(FE+2257),33,33
1970 POKE(FE+2297),33,33
1980 POKE(FE+2337),33,33
1990 POKE(FE+2377),33,33
2000 POKE(OF+123),0,0,0,0,0,0,0,0,0
2010 POKE(OF+163),0 :POKE(OF+171),0
2020 POKE(EF+2057),33,33
2030 POKE(FE+2097),33,33
2040 POKE(EF+9),216,215
2050 POKE(FE+49),208,208
2060 POKE(OF+6),62,0,62,208,208
2070 POKE(OF+46),66,67,86,208,208
2080 POKE(OF+86),0,67,0,208,208
2090 POKE(OF+126),0,67,0,208,213
2100 POKE(OF+164),62,62,62,74,166,6
2,62
2110 POKE(OF+204),74,67,67,67,99,67
,74
2120 POKE(OF+247),67,67,99
2130 POKE(OF+287),68:FE=FE+40
2140 OF=OF+40:FORIB=1TO10:NEXTIB
2150 NEXTBI
2160 OF=OF-40
2170 POKE(EF+9),0,0
2180 POKE(FE+49),0,0
2190 POKE(OF+6),0,0,0,0,0,0
2200 POKE(OF+46),0,0,0,0,0,0
2210 POKE(OF+86),0,0,0,0,0,0
2220 POKE(OF+126),0,0,0,0,0,0
2230 POKE(OF+164),0,0,0,0,0,0,0,0
2240 POKE(OF+204),0,0,0,0,0,0,0,0
2250 POKE(OF+247),0,0,0,0
2260 POKE(OF+287),0
2270 EF=EF+49:FORFI=1TO400STEP40
2280 POKEEF,0,0:POKE(EF+2048),113,1
13
2290 EF=EF+40:NEXTFI
2300 RETURN
2310 POKE(OF+6),0,0,0,208,208
2320 POKE(OF+40),0,0,0,0,0
2330 POKE(OF+84),0,0,0,0,0,0
2340 POKE(OF+114),0,0,0,0,0,0,0,0,0
,0,0
2350 POKE(OF+162),0,0,0,0,0,0,0,208
,208,0,0
```

Review of the PC-1400 series

By David Saunders

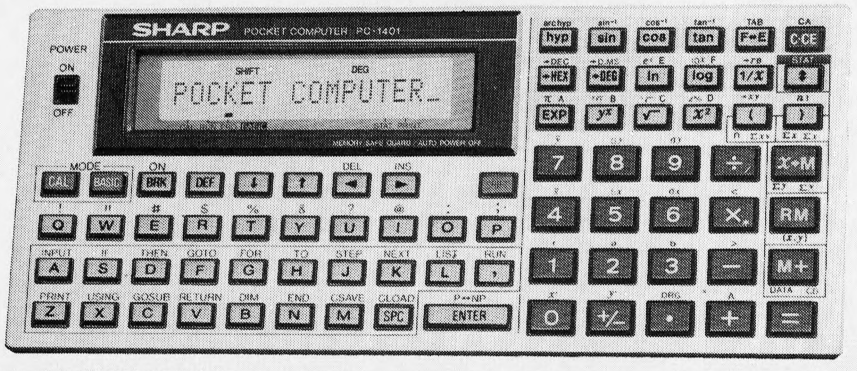
SHARP have three computers in the 1400 series available in Australia. They are the PC-1401, the PC-1421 and the new PC-1450.The 1401 is a scientific calculator and computer, and the 1421 a financial calculator and computer. As these two machines are so similar, it is worth looking at them first before going on to the 1450.



Both machines are a convenient 170mm x 72mm x 9.5mm, supplied with a very practical hard cover which covers the keyboard of the machine whilst it is not being used. With the machine in use, the cover slides unobtrusively along the back of the machine. As a handy extra, the hard cover has printed in it the error signals and their explanations.

The machines have a 76-character keyboard, a 16-character display and 4.2k of RAM with 40k of ROM. Memory safeguard is built in so that neither program nor data is lost upon power off. Automatic power off occurs if no key is pressed for about ten minutes - providing the machine is not actually performing a program. There is a positive tumbler switch for turning power off manually and is not prone to being accidentally switched on. Battery consumption is therefore kept, within practicality, to a minimum being actually the machine's operating time.

The construction of the machines is excellent with a metal faceplate and backplate sandwiching a rigid plastic body. The top and bottom of the body are grooved to allow the hard cover to be slid into its desired position. The left-hand side of the body has an 11-pin port which will be discussed later, and the right-hand side has a display contrast control. Adjustment of this control allows for the most effective viewing of the display under different lighting conditions.



So the machines are ruggedly and cleanly built with no need for kid gloves treatment. They are designed to be used in the classroom, laboratory or office. They can be put in the briefcase or the glove-box of the four-wheel-drive and come out working. They are even child proof!

The display basically occupies the upper left quadrant of the machine's face. As normal, predictable liquid crystal displays with obvious symbols or status marks let the operator know at a glance just where the machine is set. Naturally, there are variations between the display of the PC-1401 (scientific) and the PC-1421 (business), but there is no point in itemising them in this review. The display is the primary method of output of information from the machine and as such, is eminently legible with no confusion between any of the numbers or letters. The decimal point leaves no error for doubt in its position.

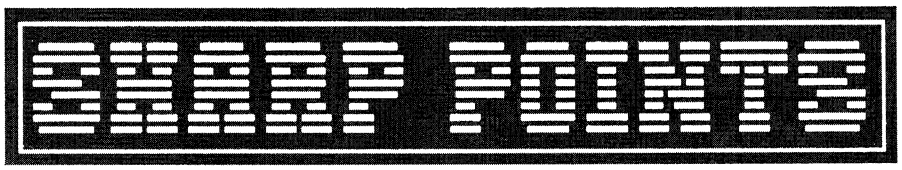
The lower left quadrant of the face is occupied by the alphabetic keyboard with a few other buttons used in controlling the machine or in editing. It is a standard QWERTY keyboard and the keys are of an acceptable size - even to a hamfisted person like myself. All of the actual alphabetic keys have a second function labelled above them which is achieved by the use of the shift key. Eighteen of these second functions are for commonly used keywords used in Basic programming. This means that those keywords can be put into programs with just two keystrokes - the shift key followed by the relevant letter. However, of those eighteen, thirteen can be utilised with just two keystrokes anyway by using their shortest abbreviations, so this is no big deal. If designing the machine for myself, I would have been inclined to have those thirteen spaces filled with keywords which take more than two keystrokes to put into the machine - but a small fault.

The lower right quadrant of the face of the machine holds the numeric keys, the arithmetic symbol keys and three keys used in statistical calculations. There are now changes beginning to appear between the two machines. The second functions of the keys vary one to the other but again, those variations are of no importance to this review.

The obvious major differences between the two machines occur in the upper right quadrant. Here lie the keys which make the 1401 scientific and the 1421 financial.

We'll look at the PC-1401 first. As a direct keyboard operation (without any programming of the machine's computer operation) the following mathematical functions are available:

Hyperbolic
Trigonometric
Logarithmic
Exponential



MZ-800 MULTIPLAN Installation

Installation is amazingly simple. First run the program INSTALL, then in response to the prompt for terminal types, select No. 22 (DEC VT-100 without graphics).
That's all!

The Key Assignments (cursor, function and special purpose) are made using the SETUP utility which should be copied onto the disc which is to contain the installed MULTIPLAN using the command:

PIP B:= A:SETUP.COM

So, run SETUP then select option No. 9 USER DEFINABLE KEY (refer to pages 37 and 38 of the P-CP/M manual).
The keys should be assigned as follows:

KEY	ASSIGNMENT	FUNCTION
BLANK	^H (1)	Backtab through menu or delete through field
SHIFT+BLANK	^Y	Delete within edit field
TAB	^I	Tab through menu or tab to next field
SHIFT+TAB	^C	Cancel (returns to main menu)
INST	^Q	Top left
SHIFT+INST	^Q	Top left
DEL	^H (2)	Backtab through menu or delete backspace through field
SHIFT+DEL	^Z	Bottom right
	^E	
SHIFT+	^E	
	^X	
SHIFT+	^X	
	^D	
SHIFT+	^D	
	^S	
SHIFT+	^S	

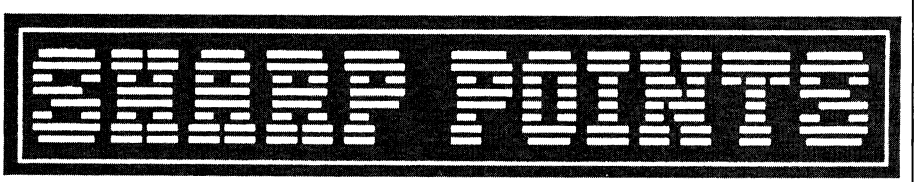
(1) Press INST key followed by 08
(2) Press INST key followed by 13

F1	^K	Character left
F2	^L	Character right
F3	^O	Word left
F4	^P	Word right
F5	^K	
F6	^L	
F7	^O	

F8	^P
F9	^K
F10	^L
F11	^O
F12	^P
F13	^K
F14	^L
F15	^O
F16	^P

Note that control characters are displayed in inverse video.
Save these key assignments permanently to the disc by selecting option No. 1 from the END OF SETUP menu.
If desired, the disc can be configured so that MULTIPLAN automatically loads up when the disc is booted. This is achieved as follows:

1. Run SETUP.
2. Select option No. 1 AUTO EXECUTE FILE (refer to page 29 of the P-CP/M manual).
3. Set Auto Execute to ON.
4. Insert the filename MULTIPLAN in the command line.
5. Save these parameters permanently to the disc as described above.

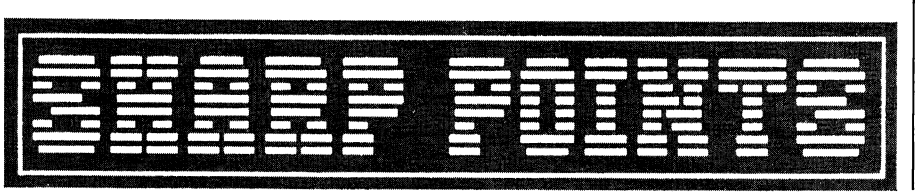


MZ-3500 Format Programs

The MZ-800 has the ability to read MZ-3500 format discs, thus making available a number of existing packages.
If the copy of the programs to be installed is in MZ-3500 format, follow this procedure:

1. Load the P-CP/M system disc in drive A.
2. Run the utility program DISKDEF - set drive B to MZ-3500 format.
3. Load the utility program PIP.
4. Remove the system disc from drive A and insert a blank disk, (MZ-800 format)
5. Execute the following command - A:=B*.*
6. When all the files have been copied across, press ^Z (control Z).

The files can now be accessed by the disc drive in MZ-800 format.



Hexadecimal Conversions
Reciprocals
Angle Conversions
Square roots
Polar/Rectangular Conversions
Raising to Powers
Extraction of Roots
Factorials
Percentages
Statistical Calculations

Quite a handful and all quite simply operated. It cannot be expected that some of the operations are absolutely child's play. Correct sequences of key operation are required, but operator competence would be very quickly achieved with a little practice. I also feel that subject knowledge and interest would make operation far simpler. For example, I have neither of the latter in statistics and so found going through the examples arduous and meaningless. That is not, of course, a machine fault. For me, the machine handled perfectly those topics that I understand.

The PC-1421's keyboard operations are power function; exponential functions; natural logarithms; roots; reciprocals; factorials; percentages; interest calculations (with present value and future values); amortization; discounted cash flow and statistics. As I am no great one on business, two of my accountant friends evaluated that aspect of the machine for me. The first found the machine very good and the second regretted that, only a fortnight earlier, he had bought the very high-priced equivalent machine from one of Sharp's better-known opposition!!

So the machines as calculators work very well indeed. What are their capabilities as computers? They are very good. All the essential operations are there. There are some frills in other computers that do not appear in these machines - but they are frills that are not completely necessary.

However, as computers, they have

some quite delightful surprises. It seems that, as a general principle, each of the functions that can be arrived at in the CALCULATOR mode has a corresponding keyword in the BASIC (or computer) mode. Just to take an example, to find the factorial of the number 39 in the calculator mode we type in 39 SHIFT and then the key with n! above it. In the basic run mode we type in FACT 39 and get exactly the same result. In the Basic program mode we set up a line which reads PRINT FACT 39 and then run that line. Same result again. More sensibly, as a program line we would do something like 100: "F" INPUT number-";F:PRINT FACT F: GOTO "F". To do the same thing on a PC-1500 or other machines would require the following line:

100"F" INPUT" number-";F: X=1: FOR Y=1 TO F: X=X*Y: NEXT Y: PRINT Y: GOTO "F"

So, in the 1400 series, the actual factorial calculation is done in one byte whereas nineteen would be needed on other machines (allowing one byte per keyword). That is a quite magical memory saving.

Now, here is another intriguing surprise! Sharp designed, built and released the PC-1401 quite some months before getting to work on the PC-1421. So they used the PC-1401 as the "frame" on which to build the PC-1421. They have replaced the "SCIENTIFIC" keys with "business" keys for use in the calculator mode. But they have left all the scientific keywords - and their functions - in the BASIC mode and they have slotted the business functions into blank spaces that existed in the PC-1401. So the PC-1421 can do all that the PC-1401 will do plus the business functions. Quite a bonus for PC-1421 purchasers!

The only option available for the machines is the CE-126P printer which plugs into the port mentioned earlier. This is a thermal paper printer/cassette interface. For the serious user I would consider it a "must", being able to print out calculation results or programs and keep a hard copy of those I would personally find essential. And, for the user who wishes to operate many and varied programs, the ability to tape programs in or out of the machines is critical.

I can only say the machines are magnificent and are very good value for money.

So what is this PC-1450?

At first glance it looks exactly like the PC-1401 with the same general keyboard layout. But a check reveals that it is bigger and there are some keyboard changes. Plus, there is a trap-door in the back and there is another port on the right hand side of the machine.

Being inquisitive, I opened up the little trap-door on the back of the machine and there was a RAM CARD - A 4k card in the machine on trial but it will take an 8k or a 16k as used in the PC-1350 or in the PC-2500. In fact, providing you have programs which are common to all machines, the same card can be swapped - and runs - on any of the machines. The PC-1450 will not operate - even in calculator mode - without a card in it. So the PC-1450 has all the benefits of the PC-1401 but the memory can be expanded up to 16k. Very nice.

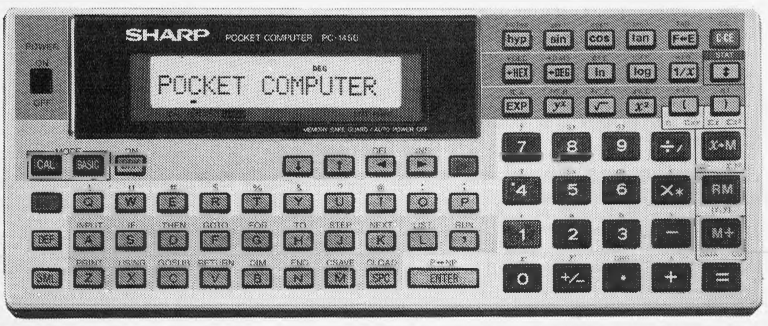
Now what about the keyboard? There are a few cosmetic changes in the alphabetic section, an extra SHIFT key has been added and a SML (Lower case letters) key has been added. Otherwise it is identical to the PC-1401. No complaints about any of that!

And the extra port on the right hand side? It is a serial input/output port which allows, with suitable hardware, for coupling to other printers, computers, modems(?), the world (?). An excellent facility but one that I cannot test without the hardware so can only presume it all works. The most exciting prospect is mention of the CE516P printer (which is due for release - and my review - any day now). This is a four-colour printer/plotter which will take 114mm roll paper or A4 sheets. And the PC-1450 will drive that. A very thrilling prospect!!

The PC-1450 has a few extra keywords in basic to allow for the serial I/O operation and has added MERGE and CHAIN for program work from tape. You can expect to still need the CE-126P for taping operations unless you have the hardware to go out through the serial I/O port.

COSTS

PC-1450	245.00
PC-1421	199.00
PC-1401	199.00
The following items are available for all three machines:	
CE126P - Ptr/Cass Interface	140.00
CE124 - Cassette Interface	33.00
CE152 - Cass.Tape Recorder	110.00
EA1250P - 5 Paper rolls	4.50
EA11E - CE152 AC Adaptor	13.85
EA23E - CE126P AC Adaptor	13.85
The following items are available for the PC-1450 only:	
CE201M - 8k RAM Expansion	130.00
CE202M - 16k RAM Expansion	145.00
CE130T - RS232C Level Conv.	130.00



Text Editor Program for the PC-1500

from Alistair Traylen

This Text Editor program for the pocket PC-1500 allows line commands such as move, copy, insert and delete, a line length of 80 characters, with a possibility of 79 tab settings.

In addition, it provides immediate mode editing (in the same way as programming with Basic), a maximum character entry speed of 170 characters per minute and the facility to direct the text file to cassette, CE150 printer, or CE158 interface.

OPERATING GUIDE

In order to distinguish between single key and multiple key operations, keys such as ENTER will be shown as <ENTER> etc.

Starting

To start the program and clear an existing text file, type RUN <ENTER>. To start the program and retain the text file, hit <DEF> Z.

Input of Text

This is basically the same as inputting a program line in program mode, but the program supplies the line numbers as you type. When you have typed 76 characters on a line, the program will beep to warn you of the impending line end. You may keep on typing and the program will wrap the text to the start of the next line. Note - hitting <ENTER> will wipe from the right of the cursor to the end of the line.

Scrolling

Up and down arrow keys scrolls up and down through the text.

Insertion and Deletion

This is the same as normal, ie. <SHIFT> <INS> for insertion or <SHIFT> <DEL> for deletion.

Tab setting

To set a TAB at the current cursor location hit the <MODE> key.

To recall the next TAB location hit the <RCL> key.

To clear a TAB at the current cursor location hit the <CL> key.

Line Commands

At any time the command mode may be entered by hitting the <MODE> key. The menu will be displayed and you only need to press the key under the command you wish to be executed. To return to the text, hit the <ENTER> key.

mov	-	moves line to location nominated
cpy	-	copies line to nominated line
del	-	deletes line nominated
ins	-	inserts a line at the location nominated
dis	-	goes to that line
I/O	-	input output mode displays new menu

```
1       CLEAR :GOTO 7997
90      WAIT 0:PAUSE "DATA SORT"
91      INPUT "Char. from left# ";QW:INPUT
        "No of char.# ";QE
100     INPUT "SIZE OF LIST";L
166     P=0
170     M=L
175     M=INT (M/2)
180     IF M=0 GOTO 270
182     P=P+1
184     PRINT "PASS";P
185     FOR ST=0 TO M-1
190     I=ST
195     J=ST+M
200     SW=0
204     LET A$=MID$ (B$(I),QW,QE): B$=MID$
        (B$(J),QW,QE)
205     IF A$<B$ OR A$=B$ GOTO 235
210     SW=1
215     B$(U)=B$(I)
220     B$(I)=B$(J)
225     B$(J)=B$(U)
235     I=J
240     J=J+M
245     IF J<=L GOTO 204
250     IF SW=0 GOTO 260
255     GOTO 190
260     NEXT ST
265     GOTO 175
270     PRINT "SORT DONE"
290     GOTO 8800
7997    PAUSE "Copyright A. Traylen 1982."
7998    INPUT "No of lines? Default=90 ";U: GOTO
        8000
7999    U=90
```

```
8000  DIM T$(80)*1,P$(1)*80,B$(U)*80:
      J=STATUS 3+3
8005  POKE STATUS 2,&FD,&88,&BE,&E2,&78,&FD,
      &0A,&0E,&9A
8006  POKE &77F0,&A5,&77,&FF,&2A,&CD,&BA,&9A
8010  "Z"W=1:C=3:L=0:WAIT 0:GOTO 8220
8020  POKE &7B0E,4:CALL STATUS 2,D$: D=ASC D$:
      IF D>31 GOTO 8180
8030  IF D=29 GOSUB 8270
8040  IF D=28 GOSUB 8290
8050  IF D=24 LET T$(W+C-4)="":BEEP 1
8057  IF D=13 LET F=W+C+1+J+(L*80): POKE &77FF,
      80-(W+C-2): CALL $77F0,F: GOTO 8220
8060  IF D+25 GOSUB 8140
8070  IF D=31 GOSUB 8130
8080  IF D>=8 OR D<13 ON D-7 GOTO 8240,8800,
      8220,8260,8185
8090  CURSOR 3:PRINT MID$ (B$(L),W,25)
8100  CURSOR C:PRINT CHR$ 127
8105  IF W+C=76 BEEP 4,25,200
8110  IF W+C=80 GOTO 8220
8120  GOTO 8020
8130  LET T$(W+C-3)="*":BEEP 1: RETURN
8140  BEEP 1:LET M=W:N=C: FOR Q=(W+C-3) TO 79
8150  Z+1:LET B$(L)=B$(L)+" ":GOSUB 8190: IF
      T$(Q) LET Z=0:RETURN
8160  NEXT Q
8170  LET W=M:N=C:RETURN
8180  POKE J+W+C+(L*80),D: GOTO 8190
8185  IF W+C>LEN B$(L)+3 GOTO 8090
8190  C=C+1:IF C=26 LET W=W+(W,55): LET C=25
8200  IF Z=1 LET Z=0:RETURN
8210  GOTO 8090
8220  LET L=L+(L<U):W=1:C=3:CLS : CURSOR 0:
      PRINT L
8230  GOTO 8090
8240  CURSOR C:PRINT " ":C=C-(C>3):IF C=3 LET
      W=W-(W>1)
8250  GOTO 8090
8260  L=L-(L>0):W=1:C=3:CURSOR 0:CLS : CURSOR
      0:PRINT L:GOTO 8090
8270  P$(0)=LEFT$(B$(L),W+C-4):P$(1)=MID$
      (B$(L),W+C-2,80-W-C): B$(L)=P$(0)=P$(1)
8280  CLS :CURSOR 0:PRINT L:RETURN
8290  P$(0)=LEFT$ (B$(L),W+C-4): P$(1)=MID$
      (B$(L),W+C-3,80-W-C)
8300  B$(L)=P$(0)+"  "+P$(1):GOTO 8280
8310  INPUT "FILE NAME ?";F$:PAUSE "SET TAPE
      RECORD":PRINT #F$;B$(*): RETURN
8320  RETURN
8330  INPUT "FILE NAME ?";F$:PAUSE "SET TAPE
      PLAY": INPUT #F$;B$(*)
8340  RETURN
8345  REM PRINT ROUTINE
8380  OPN "LPRT":CONSOLE 80,1: GOTO 8400
8390  SETCOM 600,8,N,2:SETDEV PO: CONSOLE 80,1
8400  FOR O=0 TO U
8410  IF B$(O)<>" "LPRINT B$(O)
8415  NEXT O
8417  GOTO 8010
8420  GRAPH :LINE -(220,0):TEXT :LF 5:GRAPH
      :SORGN :ROTATE 1:CSIZE 2
8430  S=1:T=11:G=0
8440  FOR X=1 TO 61 STEP 20
8450  FOR Y= 10 TO 0 STEP -1
8455  X$=MID$ (B$(Y+G),X,10)
8460  IF X$=" " GOTO 8490
8470  GLCURSOR (200-19*Y,-X*12)
8480  LPRINT X$
8490  NEXT Y
8500  FOR Y=0 TO 10
8510  X$=MID$ (B$(Y+G),X+10,10)
8520  IF X$=" " GOTO 8550
8530  GLCURSOR (200-19*Y,-(X+10)*12)
8540  LPRINT X$
8550  NEXT Y
8560  NEXT X
8570  G=G+11:IF B$(G)=" " GOTO 8590
8580  IF G<U TEXT :LF 5:GRAPH :SORGN :ROTATE
      1:GOTO 8440
8590  TEST :LF 5: GOTO 8010
8600  REM MOVE LINE
8610  INPUT "Move line #?";E:INPUT "To line
      #?";F:LET B$(F)=B$(E): LET B$(E)="": LET
      M1=E
8615  GOSUB 8705:RETURN
8620  REM COPY LINE
8630  INPUT "Copy line #?";E:INPUT "Place in
      line #?";F:LET B$(F)=B$(E):RETURN
8640  REM INSERT LINE
8650  INPUT "Insert line after line #?;M1:
      M1=M1+1
8660  FOR M=U-1 TO M1 STEP -1
8670  LET B$(M+1)=B$(M):NEXT M
8675  LET B$(M1)=" "
8680  RETURN
8690  REM DELETE LINE
8700  INPUT "Delete line #?";M1
8705  LET B$(M1)=" "
8710  FOR Q=M1 TO U-1:LET B$(Q)=(Q+1): NEXT Q
8720  RETURN
8800  CLS :R=L
8810  PRINT "mov.cpy.ins.del.dis.I/O."
8820  z=ASC INKEY$ :ON Z-16 GOSUB 8610,8620,
      8640,8690,8850,8870
8830  IF Z=13 CLS :L=R-1:GOTO 8220
8840  GOTO 8810
8850  INPUT "Line no #";L:L+1:GOTO 8260
8870  CLS :WAIT 0:BEEP 4
8875  V=ASC INKEY$
8880  PRINT "sav.lod.prt.ser.par.sort"
8885  ON V-16 GOTO 8310,8330,8420,8390,8380,90
8890  IF V=11 LET R=L-18: GOTO 8820
8900  GOTO 8875
```

User Group Information

Each month we will provide as much space as is necessary to promote existing Sharp User groups and help establish new ones.

Our aim is to publish the Names, Suburbs and Telephone numbers of people who are, or would like to be, contact points for specific groups.

Readers, who may otherwise not be aware of a group in their locality, will get in touch with the contacts. Similarly, any enquiries we receive can be referred to the contact points.

In order to take advantage of this opportunity to advertise the existence of your group free of charge (or to start a new group), all interested parties are invited to submit the following details:

Name of Group, Association or Society
Address of regular meeting place (include Post Code)
Date of each regular meeting (eg. 1st Tuesday each month)
Time of regular meetings (eg. 8.00p.m. to 10.30p.m.)
Activities - including the range of equipment normally used
Special interest sub-groups (if any)
Name, Address and Telephone number of contact points

Naturally there are deadlines for each edition of SHARP FOCUS. Without making any promises, any details received by the 15th of each month will normally be included in the next months publication.

Please send your submissions directly to The Editor, SHARP FOCUS, Shop 2, 33 The Centreway, Mt. Waverley, Victoria 3149.

VICTORIA

Sharp Computer Users' Association

Venue: Burwood Heights Primary School, Mahoney's Rd., East Burwood.
Date: The second Friday of each month.
Time: From 7.30 p.m. onwards. Often with guest speakers followed by special interest groups for Graphics, Programming and Games.
Contact: Arthur Harris (03) 233 4661

Geelong Sharp User Group

Venue: YMCA, 78 Yarra Street, Geelong.
Date: Twice a month - the second Monday is a workshop and the last Monday is a general meeting.
Time: 7.00 p.m to 9.30 p.m. Meetings normally cover the MZ series only.
Contact: John Carassellos (052) 91271 PO Box 936, Geelong, 3220

NEW SOUTH WALES

Pocket Computer Users' Club

Venue: Woodstock Community Centre, Church St., Burwood
Date: The first Wednesday of each month and the following Saturday (except for January).
Time: From 7.30 on Wednesdays or 2.00 on Saturdays. For anyone interested in pocket computers whatever the brand.
Contact: George Antonijevic (02) 683 4296

SOUTH AUSTRALIA

The Adelaide Sharp Computer Club

Venue: 49 Oxford Terrace, Unley
Date: Every second Wednesday of each month.
Time: From 7.00 p.m. onwards. Mainly MZ-700 owners plus a few pockets.
Contact: Wayne Edge (08) 386 1179

WESTERN AUSTRALIA

WA Pocket Computer Club and MZ User Group

Venue: Exhibition Hall, Rockeby Road, Subiaco.
Date: Every second Thursday of each month.
Time: 7.30 - 10.00. The club consists of pocket computer owners (80%) and MZ-700 owners (20%).
Contact: Stuart Bromley (09) 277 7477

Adventures of Bold Sir Robin: The Rescue - Part 1

by Philip Riley

King Cuthbert rules the Kingdom of fuzzy-ducks. He is a fair king and his people are happy, but he has one enemy - The Black Baron. The Black Baron has tried may devious plots to overthrow the good King but until now all has failed. But the Baron has devised and carried out the most devious plan yet. He has kidnapped the King's daughter, Princess Gladys. So in a daring attempt to rescue his daughter King Cuthbert sends you, Bold Sir Robin, to gain access to the Baron's castle and escape with the princess.

You enlist the help of an informer who knows a little about the Black Baron's castle. It is not known where the princess is being kept, she could be in one of the four towers or in the dreaded dungeons that no prisoner has yet left alive. You are also shown a secret passage into the Baron's castle that leads under the moat on the east side of the castle. But the informer will only show you the entrance to this dark passage. He is too scared to enter himself. As you enter the tunnels inkey blackness, the informer gives you two last pieces of information. Don't use a light as the castle is patrolled by guards and you will be spotted, and watch out for the Baron's dragon. With these last items stored away in your memory you start to walk down the tunnel. Halfway along, the tunnel roof caves-in and you barely escape with your life. No sooner has the cave-in finished blocking off any hope of retreat, then you walk into a brick wall. The tunnel has come to an abrupt end. This is where you begin with your quest. Good luck brave Sir Robin.

INSTRUCTIONS

The game understands the usual Two word commands. TAKE SWORD, LEAVE SWORD, etc. Also single word commands such as inventory and look. Move North, South, East and West with the cursor keys, and up and down by typing in these words. All of the above commands can be shortened to the first two letters e.g. TA SW, LE SW etc. One feature is if you drop several things in one place you can pick them all up by typing in GET ALL.

Watch the top of the screen. When you see the words - YOU SEE A GUARD you have about three seconds to type in the word HIDE. Any longer than three seconds and the guard will attack you. If you manage to hide you must then attack the guard yourself by typing in ATTACK. Again these commands can be shortened to the first two letters. When spotted a guard must be attacked. By hiding first and then attacking you catch the guard by surprise and his energy rating will be much lower. You start with an energy rating of thirty. This amount is reduced each time you do battle. It cannot be replaced. Good luck.

```
10 CLS:COLOR,,6,1:CONSOLE5,20,0,40:
COLOR,,4,0:CLS:WK=INT(5*RND(1)+1):F
=1:N=21:G1=62:G2=73:G3=86:G4=89:G5=
42:Z1=1:G6=22:Z2=1:G7=90:Z3=1:G8=11
7:G9=9:YH=1
20 G$="YOU ARE IN":G1$="YOU ARE AT"
:G2$="TO THE EAST":G3$="TO THE WEST
":G4$="TO THE NORTH":G5$="TO THE SO
UTH":G6$="YOU WALK INTO":SR=40
30 G7$="YOU ARE IN THE SMALL ROOM A
T THE BASE OFTHE":G8$=" STAIRS LEAD
       UPWARDS.":G9$="YOU WALK ALON
G THE STONE WALKWAY THAT   GOES ALL
 THE WAY AROUND THE INSIDE OF   THE
 WALL.":D$="YOU ARE AT THE TOP OF T
HE.":S4=32:S2=32:S3=32
40 A1$="GETALEDRUSEXUNJUMORECLMASEB
RSMBRRIDICUPIPU"
50 A2$="LAPLSTTOKNBOKEROWOHACHBRGOV
IWIBLDEPRHOALDOPICOMIGUTAACMELOCUWA
"
60 A3$="UPDOLOINHIAT1A2A3A4A5A"
70 DIMIT$(25),IT(18)
80 FORT=0TO25:READIT$(T):NEXT:FORT=
0TO18:READIT(T):NEXT
90 DATAROPE LADDER,PLANK,STILTS,IRO
N TONGS,KNIFE,BOOK,KEYS,ROPE,WOOD,H
AMMER,CHISEL,BROADSWORD,GOBLET,VIOL
IN,WIRE,BLANKET,DEAD BODY,PRINCESS
GLADYS,HORSE,DOOR,PIT,COALS,MIRROR,
GUARD,TAPESTRY,ACID BATH
100 DATA130,84,58,23,130,130,88,86,
21,18,39,120,13,42,103,53,106,118,1
6
110 GOTO560
```

```
120 S4=S4+1:IF(S3=41)*(S4=42)THENS2
=S2+1:S3=32:S4=32
130 IFS4=42THENS3=S3+1:S4=32
140 B$="":PRINT:PRINT[3,0]"WHAT NEX
T BOLD SIR ROBIN":POKE53349,13,15,2
2,5,19,43,S2,S3,S4
150 GETA$:IFA$=""THEN150
160 IF(HH=1)*(TI$)"000003")THEN3730
170 A=ASC(A$):B$=B$+A$
180 IF(A=17)+(A=18)+(A=19)+(A=20)TH
EN380
190 IFA=16THENPRINTRIGHT$(B$,1)" "
;:B$=LEFT$(B$,LEN(B$)-2):GOTO150
200 IFA=13THEN220
210 PRINTA$;:GOTO150
220 FORT=1TOLEN(B$):Q$=MID$(B$,T,1)
:IFQ$=" "THEN240
230 NEXT:GOTO320
240 X$=LEFT$(B$,2):Z$=MID$(B$,T+1,2
)
250 FORX=1TOLEN(A1$)STEP2
260 IFX$=MID$(A1$,X,2)THEN280
270 NEXT:GOTO310
280 AA=-1:FORZ=1TOLEN(A2$)STEP2
290 AA=AA+1:IFZ$=MID$(A2$,Z,2)THEN3
50
300 NEXT
310 PRINT:PRINT"I DON'T UNDERSTAND.
 TRY SOMETHING ELSE.":GOTO120
320 Y$=LEFT$(B$,2):FORY=1TOLEN(A3$)
STEP2
330 IFY$=MID$(A3$,Y,2)THEN2940
340 NEXT:GOTO310
350 PRINT:IFHH>0THENPRINT"YOU MUST
FIGHT THE GUARD FIRST.":GOTO120
360 ONXGOTO3080,0,3080,0,3190,0,319
0,0,3210,0,3310,0,3230,0,3600,0,356
0,0,3520,0,3620,0,3540,0,3470
370 ONX-26GOTO3280,0,3640,0,3280,0,
3390,0,3410,0,3360,0,3440,0,3690
380 IF(A=17)*(S1=1)*(HH=0)THENN=N-7
:GOTO430
390 IF(A=18)*(N1=1)*(HH=0)THENN=N+7
:GOTO430
400 IF(A=19)*(E1=1)*(HH=0)THENN=N+1
:GOTO430
410 IF(A=20)*(W1=1)*(HH=0)THENN=N-1
:GOTO430
420 PRINT[2,0]"YOU CANNOT MOVE IN
THAT DIRECTION.":GOTO120
430 IFYP=10ITHEN2250
440 IF(YP=15)*(Y5=1)*(N=39)THENN=N-
7:GOTO3890
450 IF(YP=32)*(Y5=1)*(N=8)THENN=N+1
:GOTO3890
460 IF(YP=17)*(Y5=1)*(N=26)THENN=N-
1:GOTO3890
470 IF(YP=5)*(Y5=1)*(N=5)THENN=N+7:
GOTO3890
480 IFN=-3THEN3860
490 POKE53332,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0
500 ONFGOTO510,520,530,1970,540
510 ONNGOTO1150,1160,1180,710,640,6
20,0,1110,1130,1140,690,660,600,0,1
070,1090,1100,680,670,580,560,1010,
1030,1050,870,890,740,0,990,940,930
,840,850,760,0,970,950,910,820,800,
780
520 ONNGOTO1200,1230,1250,1260,1300
,1320,0,1530,0,0,1280,0,1340,0,1510
,0,0,0,0,1360,0,1500,1540,1560,1580
,1600,1380,0,1490,0,0,0,0,1400,0,14
80,1470,1460,1450,1430,1420
530 ONNGOTO1620,1640,1680,1690,1700
,1710,0,1900,0,0,0,0,1730,0,1890,0,
0,0,0,1740,0,1870,1910,1930,1940,19
60,1750,0,1860,0,0,0,0,1770,0,1840,
1830,1820,1810,1800,1780
540 ONNGOTO0,0,0,0,0,0,2660,0,0,0,0
,2580,2610,2630,0,0,0,2450,2470,0,0
,0,0,2410,2430,2490,2520,0,0,0,2390
,0,2370
550 ONN-35GOTO2010,2030,2050,2330,2
350,0,0,0,0,2070,0,2380,0,0,0,0,210
0,0,0,0,0,0,0,0,2120,0,2290,2310,0,0,
2170,2150,2190,2210,0,0,0,0,0,2250,
2230
560 YP=0:N1=0:S1=0:E1=0:W1=0:GOSUB2
720:IFX8=1THENW1=1:PRINTG3$;" IS AN
 OPEN DOORWAY."
570 PRINTG$;" A DARK TUNNEL THAT RU
NS EAST AND WEST. ";G2$;" THE TUNNE
L HAS    CAVED IN. ";G3$;" IS A BLA
NK WALL.":GOTO2680
580 YP=1:N1=1:S1=1:E1=0:W1=0:GOSUB2
720
590 PRINTG$;" A LARGE ROOM. EXPENSI
VE      CARPETS ARE ON THE FLOOR AN
D BEAUTIFUL  PAINTINGS HANG ON THE
WALL. ALL THE     FURNITURE IN THIS
 ROOM IS MADE FROM OAK.":GOTO2680
600 YP=2:N1=1:S1=1:W1=0:E1=0:GOSUB2
720
610 PRINTG6$;" WHAT IS OBVIOUSLY A
STUDY.A LARGE DESK FILLS THE CENTRE
 OF THE    ROOM. LARGE MAPS ADORN T
HE WALLS.":GOTO2680
620 YP=3:N1=1:S1=0:E1=0:W1=1:GOSUB2
720
630 PRINTG$;" THE LIBARY. THE BARON
 HAS A  TOTAL OF FIVE BOOKS AND HE
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IS VERY      PLEASED BECAUSE HE HAS
 ALREADY COLOURED TWO OF  THEM.":GO
TO2680
640 YP=4:N1=1:S1=0:E1=1:W1=0:GOSUB2
720
650 PRINTG$;" THE MAIN RECEPTION AR
EA. THISIS WHERE THE BARON RECIEVES
 HIS GUESTS  AND THE EXPENSIVE FURN
ISHINGS WOULD      IMPRESS THE GUEST
S GREATLY. ";G4$;"ARE THE MAIN DOOR
S THAT LEAD OUT TO THE COURTYARD.":
GOTO2680
660 YP=5:N1=1:S1=1:E1=0:W1=0:GOTO28
40
670 YP=6:N1=0:S1=1:E1=0:W1=1:GOTO28
40
680 YP=7:N1=1:S1=1:E1=1:W1=1:U1=0:G
OTO2840
690 YP=8:S1=1:N1=1:E1=0:W1=0:U1=1:D
1=0:GOSUB2720
700 PRINT"YOU WALK UNDER THE ARCHWA
Y OF THE MAIN  TOWER THAT GUARDS TH
E DRAW BRIDGE. YOU  CAN SEE A SMALL
 STAIRWAY LEADING UP INTOTHE TOWER.
":GOTO2680
710 YP=9:N1=1:S1=0:E1=0:W1=0:U1=0:G
OSUB2720
720 IFY4=1THENS1=1:PRINT"LOOKING SO
UTH YOU SEE THE DRAWBRIDGE ANDPORTC
ULLIS ARE NOW OPEN.":GOTO2680
730 PRINT"YOU ARE NOW STANDING NEXT
 TO THE        DRAWBRIDGE AND PORTC
ULLIS. BOTH OF THESEBLOCK YOUR WAY
SOUTH.":GOTO2680
740 YP=10:N1=1:S1=1:E1=0:W1=1:U1=0:
GOSUB2720
750 PRINTG6$;" A LARGE BALLROOM. TH
E     FLOOR IS MADE OF POLISHED OAK
 AND THE   WINDOWS OVERLOOKING THE
COURTYARD ARE   CURTAINED IN BEAUTI
FUL BLUE VELVET.":GOTO2680
760 YP=11:N1=1:S1=1:E1=0:W1=0:U1=1:
D1=0:GOSUB2720
770 PRINTG1$;" THE BASE OF A FLIGHT
 OF      STAIRS LEADING UPWARDS. TH
EY ARE VERY   WIDE AND CURVE TO THE
 RIGHT AS THEY NEARTHE SECOND FLOOR
 OF THE CASTLE.":GOTO2680
780 YP=12:N1=0:S1=1:E1=0:W1=1:U1=0:
GOSUB2720
790 PRINTG6$;" THE BARONS GALLERY.
HE IS OBVIOUSLY A MAN OF TASTE, THE
 PAINTINGS HANGING ON THE WALLS ARE
 REALLY         BEAUTIFUL.":GOTO268
0
800 YP=13:N1=0:S1=0:E1=1:W1=1:GOSUB
2720
810 PRINTG$;" A LARGE DINNING ROOM.
 MOST OFTHE ROOM IS TAKEN UP BY A L
ONG OAK TABLETHAT MUST HAVE AT LEAS
T THIRTY CHAIRS   AROUND IT.":GOTO2
680
820 YP=14:N1=0:S1=1:E1=1:W1=1:GOSUB
2720
830 PRINTG6$;" THE KITCHEN,  THE WA
LL ";G4$;" IS DOMINATED BY A LARGE
      CHIMNEY. THE ASHES IN THE GRA
TE ARE     STILL SMOKING AND THE RO
OM ITSELF HAS A WONDERFUL SMELL TO
IT.":GOTO2680
840 YP=15:N1=1:S1=1:E1=1:W1=1:GOTO2
900
850 YP=16:N1=0:S1=0:E1=0:W1=1:GOSUB
2720
860 PRINTG$;" THE BARONS STABLE, TH
E SMELL HERE IS REALLY STRONG. I sh
ould be very careful where you stan
d here.":GOTO2680
870 YP=17:N1=1:S1=1:E1=1:W1=0:GOSUB
2720
880 PRINT"YOU WALK UNDER THE ARCH T
HAT SEPERATES  THE INNER COURTYARD
FROM THE MAIN       COURTYARD. ";G2
$;" YOU CAN SEE A    SMALL  DOORWAY
 THAT LEADS INTO THE INNEREAST  WIN
G OF THE CASTLE.":GOTO2680
890 YP=18:N1=0:S1=0:E1=1:W1=1:GOSUB
2720
900 PRINTG6$;" THE INNER EAST WING
OF THECASTLE. THIS ROOM LOOKS LIKE
A WORKSHOP.MANY TOOLS ARE LYING ARO
UND ON THE FLOORAND WORKBENCHES AND
 THE FLOOR IS COVEREDIN A LAYER A S
AWDUST.":GOTO2680
910 YP=19:N1=0:S1=0:E1=1:W1=1:GOSUB
2720
920 PRINTG$;" THE CASTLES PANTRY. L
ARGE    JOINTS OF MEAT ARE HANGING
FROM HOOKS   AND FRESH FRUIT AND VE
GETABLES ARE       EVERYWHERE.":GOTO
2680
930 YP=20:N1=0:S1=0:E1=1:W1=1:GOTO2
900
940 YP=21:N1=0:S1=0:E1=1:W1=0:GOTO2
900
950 YP=22:N1=0:S1=0:W1=1:E1=1:GOSUB
2720
960 PRINTG$;" THE SERVANTS QUARTERS
. THE   BARON OBVIOUSLY DOES NOT CA
RE ABOUT HIS SERVANTS AS THEY ARE S
LEEPING ON THE    FLOOR WITH NO FUR
NITURE AT ALL. I shouldbe very quie
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t here, you don't want to  wake th
e servants.":GOTO2680
970 YP=23:N1=0:S1=1:E1=1:W1=0:GOSUB
2720
980 PRINT"THIS IS OBVIOUSLY THE STO
REROOM FOR ALL THE CASTLES JUNK. WO
ODEN BOXES ARE  STACKED EVERYWH
ERE AND IN SOME PLACES ITLOOKS AS T
HOUGH THEY ARE ABOUT TO FALL. LARGE
 COBWEBS HANG EVERYWHERE THAT GIVE
THE PLACE THE LOOK OF NEGLECT.":GOT
O2680
990 YP=24:N1=1:S1=1:E1=0:W1=0:GOSUB
2720
1000 PRINTG6$;" ANOTHER STOREROOM.
THIS  ONE IS ALITTLE BETTER. IT IS
 MUCH  CLEANER AND LOOKS MORE
USED.":GOTO2680
1010 YP=25:N1=1:S1=1:E1=1:W1=0:U1=0
:GOSUB2720
1020 PRINTG$;" A LARGE MUSTY SMELLI
NG EMPTY ROOM.":GOTO2680
1030 YP=26:N1=0:S1=0:E1=1:W1=1:D1=0
:U1=1:GOSUB2720
1040 PRINTG$;" THE WEST INNER WING
OF THE  CASTLE. THE MOST STRIKING
FEATURE OF  THIS ROOM IS A LARGE
MARBLE FIREPLACE.":GOTO2680
1050 YP=27:N1=0:S1=0:E1=0:W1=1:U1=0
:D1=0:GOSUB2720:IF(X4=1)*(IT(0)=120
)THEND1=1
1060 PRINTG$;" THE TAPESTRY ROOM. B
EAUTIFUL TAPESTRIES ADORN THE WALLS
, THE MOST  BEAUTIFUL OF WHICH CO
MPLETELY COVERS THEEAST WALL.":GOTO
2680
1070 YP=28:N1=1:S1=1:W1=0:E1=0:U1=1
:D1=0:GOSUB2720
1080 PRINTG1$;" THE BASE OF A RATHE
R NARROW  STAIRCASE THAT LEADS UP T
O THE SECOND  FLOOR OF THE CASTLE.
":GOTO2680
1090 YP=29:N1=0:S1=1:E1=1:W1=0:U1=0
:GOTO2840
1100 YP=30:N1=0:S1=1:E1=1:W1=1:GOTO
2840
1110 YP=31:N1=1:S1=1:E1=1:W1=0:U1=0
:GOSUB2720
1120 PRINTG$;" THE ARMOURY. WEAPONS
 OF ALL  DESCRIPTIONS ARE NEATLY ST
ACKED ON  SHELVES AWAITING TO B
E USED IN BATTLE.":GOTO2680
1130 YP=32:N1=1:S1=0:E1=1:W1=1:D1=0
:U1=1:GOTO2840
1140 YP=33:N1=1:S1=0:W1=1:E1=0:U1=0
:GOTO2840
1150 YP=34:N1=1:S1=0:W1=0:E1=1:GOTO
1120
1160 YP=35:N1=0:S1=0:E1=1:W1=1:GOSU
B2720
1170 PRINTG$;" A SMALL ROOM THAT LE
ADS OFF  THE ARMOURY. IT IS CALLED
THE GUNPOWDER ROOM AND FOR OBVIOUS
REASONS. THE ENTIREROOM IS STACKED
FROM FLOOR TO CEILING  WITH BARREL
S OF GUNPOWDER.":GOTO2680
1180 YP=36:N1=0:S1=0:W1=1:E1=0:GOSU
B2720
1190 PRINTG1$;" A DEAD END. THIS IS
 THE  CANNONBALL STOREROOM. CAN
NONBALLS ARE  STACKED EVERYWHERE.
THE ONLY EXIT IS TO THE WEST.":GOTO
2680
1200 YP=37:N1=1:S1=0:W1=0:E1=1:GOSU
B2720
1210 PRINTG$;" ONE OF THE CASTLES M
ANY  BEDROOMS. THE BED IS EXTRE
MELY LARGE ANDLOOKS VERY COMFORTABL
E.":IFYP=38THENPRINT"YOU SEE A LARG
E MIRROR IN THIS ROOM."
1220 GOTO2680
1230 YP=38:N1=0:S1=0:W1=1:E1=0:IFX5
=1THENE1=1
1240 GOTO1210
1250 YP=39:N1=0:S1=0:W1=1:E1=0:GOTO
1210
1260 YP=40:N1=1:S1=0:W1=0:E1=0:D1=0
:GOSUB2720
1270 PRINTG$;" THE LITTLE ROOM ABOV
E THE  MAIN ENTRANCE TO THE CASTL
E. IT IS IN  THIS ROOM THAT THE ME
CHANISMS FOR  OPERATING THE PO
RTCULLIS AND DRAWBRIDGE ARE STORED.
":GOTO2680
1280 YP=41:N1=0:S1=1:E1=0:W1=0:D1=1
:U1=0:GOSUB2720
1290 PRINT"THIS IS A SMALL EMPTY RO
OM ABOVE THE  CASTLE ENTRANCE. A
FLIGHT OF STONE STEPSLEAD DOWN TOWA
RDS THE MAIN COURTYARD.":GOTO2680
1300 YP=42:N1=0:S1=0:W1=0:E1=1:GOSU
B2720
1310 PRINTG$;" THE MINSTRAL GALLERY
 ABOVE  THE MAIN RECEPTION AREA. L
OOKING DOWN  YOU CAN SEE THE DOUBL
E DOORS THAT LEAD  OUT TO THE MAIN
COURTYARD.":GOTO2680
1320 YP=43:N1=1:S1=0:W1=1:E1=0:GOSU
B2720
1330 PRINTG$;" THE MINSTRALS QUARTE
RS. THE  ROOM IS FULL OF MUSICAL IN
STRUMENTS AND OF COURSE SLEEPING MI
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NSTRALS. Tread      carefully here m
y friend or you will     surely die.
":GOTO2680
1340 YP=44:N1=1:S1=1:E1=0:W1=0:GOSU
B2720
1350 PRINTG6$;" A LARGE EMPTY ROOM.
 IT IS EXTREMELY COLD AND YOU SHIVE
R ALITTLE ASYOU ENTER.":GOTO2680
1360 YP=45:N1=1:S1=1:W1=0:E1=0:GOSU
B2720
1370 PRINT"YOU WALK ALONG A LONG, N
ARROW AND        TOTALLY EMPTY PASSA
GE.":GOTO2680
1380 YP=46:N1=1:S1=1:W1=0:E1=0:D1=0
:GOSUB2720:IFX7=1THENW1=1:PRINT"TO
THE WEST IS AN OPEN DOOR.":GOTO2740
1390 PRINTG$;" A NARROW PASSAGE. ";
G3$;"IS A LARGE OAK DOOR THAT IS BO
LTED SHUT.":GOTO2680
1400 YP=47:N1=1:S1=1:W1=0:E1=0:U1=0
:D1=1:GOSUB2720
1410 PRINTG1$;" THE TOP OF A FLIGHT
 OF STAIRSTHAT CURVE DOWN TO THE GR
OUND FLOOR.":GOTO2680
1420 YP=48:N1=0:S1=1:W1=1:E1=0:D1=0
:GOTO1370
1430 YP=49:N1=0:S1=0:W1=0:E1=1:GOSU
B2720
1440 PRINTG$;" THE MINSTRAL GALLERY
 THAT    OVERLOOKS THE DINING ROOM.
 YOU CERTAINLYGET A GOOD VIEW FROM
UP HERE.":GOTO2680
1450 YP=50:N1=0:S1=0:W1=1:E1=0:GOTO
1210
1460 YP=51:N1=0:S1=0:W1=1:E1=1:GOTO
1210
1470 YP=52:N1=0:S1=0:W1=1:E1=1:GOTO
1210
1480 YP=53:N1=0:S1=1:W1=0:E1=1:GOTO
1210
1490 YP=54:N1=1:S1=1:W1=0:E1=0:GOTO
1210
1500 YP=55:N1=1:S1=1:E1=0:W1=0:D1=0
:GOTO1370
1510 YP=56:N1=1:S1=1:E1=0:W1=0:D1=1
:U1=0:GOSUB2720
1520 PRINTG1$;" THE TOP OF A NARROW
 FLIGHT OFSTAIRS THAT LEAD DOWN TO
THE GROUND      FLOOR.":GOTO2680
1530 YP=57:N1=1:S1=1:W1=0:E1=0:GOTO
1210
1540 YP=58:N1=0:S1=0:E1=0:W1=0:D1=1
:U1=0:GOSUB2720
1550 PRINTG$;" A SMALL SECRET ROOM.
 THE ONLYWAY INTO THIS ROOM IS BY T
HE CHIMNEY    THAT YOU HAVE JUST CL
IMBED UP.":GOTO2680
1560 YP=59:N1=0:S1=0:W1=0:E1=1:GOSU
B2720
1570 PRINTG$;" THE BARONS PRIVATE Q
UARTERS. THE MAIN FEATURE OF THIS R
OOM IS A LARGECUPBOARD.":GOTO2680
1580 YP=60:N1=0:S1=0:E1=1:W1=1:GOSU
B2720
1590 PRINT"THIS IS THE SMALL ROOM A
BOVE THE ARCH   THAT SEPERATES THE
INNER COURTYARD FROM THE MAIN COURT
YARD.":GOTO2680
1600 YP=61:N1=0:S1=0:E1=1:W1=1:GOSU
B2720
1610 PRINT"THIS IS THE BARONS PRIVA
TE BATHROOM. HE HAS A WONDERFUL LAR
GE WASH TUB SITTING  IN ONE CORNER.
":GOTO2680
1620 YP=62:N1=1:S1=0:W1=0:E1=1:D1=0
:U1=1:GOSUB2720
1630 PRINTG7$;" SOUTH-WEST TOWER.";
G8$:GOTO2680
1640 YP=63:N1=0:S1=0:E1=1:W1=1:U1=0
:GOSUB2720
1650 PRINTG9$
1660 IFYP=81THENPRINT"STAIRS LEAD D
OWN TO THE MAIN COURTYARD."
1670 GOTO2680
1680 YP=64:N1=0:S1=0:E1=1:W1=1:GOSU
B2720:GOTO1650
1690 YP=65:N1=0:S1=0:E1=1:W1=1:GOSU
B2720:GOTO1650
1700 YP=66:N1=0:S1=0:E1=1:W1=1:U1=0
::GOSUB2720:GOTO1650
1710 YP=67:N1=1:S1=0:E1=0:W1=1:D1=0
:U1=1:GOSUB2720
1720 PRINTG7$;" SOUTH-EAST TOWER.";
G8$:GOTO2680
1730 YP=68:N1=1:S1=1:E1=0:W1=0:U1=0
:GOSUB2720:GOTO1650
1740 YP=69:N1=1:S1=1:W1=0:E1=0:GOSU
B2720:GOTO1650
1750 YP=70:N1=1:S1=1:W1=1:E1=0:GOSU
B2720
1760 PRINTG9$;" ";G3$;" YOU CAN SEE
 THE   FLAT ROOF OF THE INNER EAST
WING OF THE CASTLE.":GOTO2680
1770 YP=71:N1=1:S1=1:W1=0:E1=0:U1=0
:GOSUB2720:GOTO1650
1780 YP=72:N1=0:S1=1:W1=1:E1=0:D1=0
:U1=1:GOSUB2720
1790 PRINTG7$;" NORTH-EAST TOWER.";
G8$:GOTO2680
1800 YP=73:N1=0:S1=0:W1=1:E1=1:U1=0
:GOSUB2720:GOTO1650
1810 YP=74:N1=0:S1=0:W1=1:E1=1:GOSU
```

```
B2720:GOTO1650
1820 YP=75:N1=0:S1=0:W1=1:E1=1:GOSU
B2720:GOTO1650
1830 YP=76:N1=0:S1=0:W1=1:E1=1:GOSU
B2720:GOTO1650
1840 YP=77:N1=0:S1=1:W1=0:E1=1:U1=1
:D1=0:GOSUB2720
1850 PRINTG7$;" NORTH-WEST TOWER.";
G8$:GOTO2680
1860 YP=78:N1=1:S1=1:W1=0:E1=0:U1=0
:GOSUB2720:GOTO1650
1870 YP=79:N1=1:S1=1:W1=0:E1=1:GOSU
B2720
1880 PRINTG9$;" ";G2$;" YOU CAN SEE
 THE  FLAT ROOF OF THE INNER WEST
WING OF THE CASTLE.":GOTO2680
1890 YP=80:N1=1:S1=1:W1=0:E1=0:D1=0
:GOSUB2720:GOTO1650
1900 YP=81:N1=1:S1=1:W1=0:E1=0:U1=0
:D1=1:GOSUB2720:GOTO1650
1910 YP=82:N1=0:S1=0:W1=1:E1=1:GOSU
B2720
1920 PRINT"YOU ARE ON THE ROOF OF T
HE INNER WEST  WING OF THE CASTLE.
":GOTO2680
1930 YP=83:N1=0:S1=0:W1=1:E1=1:GOSU
B2720:GOTO1920
1940 YP=84:N1=0:S1=0:W1=1:E1=1:GOSU
B2720
1950 PRINT"YOU ARE ON THE ROOF OF T
HE INNER EAST  WING OF THE CASTLE.
":GOTO2680
1960 YP=85:N1=0:S1=0:W1=1:E1=1:GOSU
B2720:GOTO1950
1970 IFN=36THENYP=86:N1=0:S1=0:W1=0
:E1=0:U1=0:D1=1:PRINTD$;"NORTH-WEST
    TOWER.":GOSUB2720:GOTO2680
1980 IFN=1THENYP=87:N1=0:S1=0:W1=0:
E1=0:U1=0:D1=1:PRINTD$;"SOUTH-WEST
   TOWER.":GOSUB2720:GOTO2680
1990 IFN=6THENYP=88:N1=0:S1=0:E1=0:
W1=0:U1=0:D1=1:PRINTD$;"SOUTH-EAST
   TOWER.":GOSUB2720:GOTO2680
2000 IFN=41THENYP=89:N1=0:S1=0:W1=0
:E1=0:U1=0:D1=1:PRINTD$;"NORTH-EAST
    TOWER.":GOSUB2720:GOTO2680
2010 YP=90:N1=0:S1=0:W1=0:E1=1:D1=0
:U1=0:GOSUB2720:IFIT(0)=120THENU1=1
2020 PRINTG$;" A DARK EVIL SMELLING
 PASSAGE.THE WALLS ARE COVERED WITH
 A TERRIBLE  GREEN SLIME AND THE F
LOOR IS WET AND  THICK WITH MUD.
YOU ARE OBVIOUSLY IN THEBARONS DUNG
EONS.":GOTO2680
2030 YP=91:N1=0:S1=0:W1=1:E1=1:U1=0
:GOSUB2720:IFX6=1THENPRINT"YOU ARE
IN A NARROW PASSAGE. TO ONE SIDEIS
A PILE OF HOT COALS.":GOTO2680
2040 PRINT"YOU WALK ALONG THE PASSA
GE UNTIL YOUR  WAY IS BLOCKED BY R
ED HOT COALS THAT  HAVE BEEN PLAC
ED ACROSS THE PASSAGE. THEGLOW FROM
 THE COALS GIVES THE PASSAGE ANEERI
E LOOK.":GOTO2680
2050 YP=92:N1=1:S1=1:W1=1:E1=1:GOSU
B2720:IFX6=0THENPRINT"YOU TRY TO WA
LK ACROSS THE HOT COALS BUT THEY BU
RN YOU TO DEATH.":GOTO2530
2060 PRINTG1$;" THE JUNCTION OF SEV
ERAL  PASSAGES. TERRIBLE MOANS
SEEM TO COME  FROM EVERY DIRECTION
. WHAT A TERRIBLE  PLACE THIS IS."
:GOTO2680
2070 IF(BW=1)*(X3=0)THENBW=0:GOTO21
30
2080 YP=93:N1=1:S1=1:W1=0:E1=0:BW=0
:GOSUB2720
2090 PRINTG$;" A DARK NARROW PASSAG
E. THE  SMELL IS TERRIBLE DOWN HER
E.":GOTO2680
2100 YP=94:S1=1:N1=1:E1=0:W1=0:GOSU
B2720
2110 PRINT"YOU WALK ALONG THE PASSA
GE UNTIL YOU ARESTOPPED AT A PIT FU
LL OF BOILING WATER.":GOTO2680
2120 IF(BW=0)*(X3=0)THENPRINT"YOU S
TEP INTO THE BOILING WATER AND DIE
INSTANTLY.":GOTO2530
2130 YP=95:S1=1:N1=1:W1=0:E1=0:BW=1
:GOSUB2720
2140 PRINT"YOU WALK INTO A ROOM THA
T IS FULL OF  PRISON CELLS. MOST
OF THE CELLS HERE AREEMPTY.":GOTO26
80
2150 YP=96:N1=0:S1=1:W1=1:E1=1:GOSU
B2720
2160 PRINT"ANOTHER ROOM FULL OF PRI
SON CELLS AND  ALL OF THEM ARE FUL
L OF PEOPLE, SOME OF WHICH ARE DEAD
. THE SMELL HERE IS VERY  BAD INDEE
D.":GOTO2680
2170 YP=97:N1=0:S1=0:W1=0:E1=1:GOSU
B2720
2180 PRINTG$;" A SMALL EMPTY ROOM.
LARGE  COBWEBS HANG FROM THE ROOF
 GIVING THE  PLACE A LOOK OF NEGLE
CT.":GOTO2680
2190 YP=98:N1=0:S1=0:W1=1:E1=1:GOSU
B2720
2200 PRINT"YOU WALK ALONG A DARK EV
IL SMELLING  PASSAGE THAT IS ONL
Y ABOUT FOUR FOOT  HIGH MAKING IT
```

```
 NECESSARY FOR YOU TO     STOOP AS
YOU WALK.":GOTO2680
2210 YP=99:N1=1:S1=1:W1=1:E1=0:GOSU
B2720
2220 PRINTG$;" A LARGE ROOM THAT IS
 FULL OF MORE CELLS. MOST OF THE PE
OPLE IN THESE CELLS ARE DEAD OR VER
Y NEAR TO IT.":GOTO2680
2230 YP=100:N1=0:S1=1:W1=1:E1=0:GOS
UB2720
2240 PRINT"THIS IS ANOTHER DARK LOW
 PASSAGE THE    FLOOR OF WHICH IS C
OVERED IN A DARK     COATING OF SLI
ME.":GOTO2680
2250 YP=101:W1=1:E1=1:S1=1:N1=1:GOS
UB2720
2260 PRINTG$;" THE CATACOMBS."
2270 IFN=57THENN=75:YP=100:GOTO430
2280 GOTO2680
2290 YP=102:N1=1:S1=0:W1=0:E1=1:GOS
UB2720
2300 PRINTG$;" A ROOM FULL OF EMPTY
 CELLS.":GOTO2680
2310 YP=103:N1=0:S1=0:E1=0:W1=1:GOS
UB2720
2320 PRINT"YOU ARE IN WHAT LOOKS LI
KE A SMALL      STORAGE ROOM. OLD J
UNK IS LYING AROUND  EVERYWHERE. RU
STY CHAINS HANG FROM THE  CEILING A
ND IN ONE CORNER IS A PILE OF  BROK
EN THUMB SCREWS.":GOTO2680
2330 YP=104:N1=0:S1=0:W1=1:E1=1:GOS
UB2720
2340 PRINT"YOU WALK ALONG A LONG, L
OW, DARK PASSAGE":GOTO2680
2350 YP=105:N1=1:S1=1:E1=0:W1=1:GOS
UB2720
2360 PRINT"YOU ARE IN THE BARONS TO
RTURE CHAMBER.  THIS IS WHERE THE B
ARON TORTURES HIS    PRISONERS TO D
EATH.":GOTO2680
2370 YP=106:N1=1:S1=0:W1=0:E1=0:GOS
UB2720:GOTO2360
2380 YP=107:N1=0:S1=1:E1=0:W1=0:GOS
UB2720:GOTO2360
2390 YP=108:N1=1:S1=1:W1=0:E1=0:GOS
UB2720
```

You've probably become an expert typist after keying in the last few pages, so when the final part of this adventure appears in next month's magazine, it shouldn't take so long!

MZ-700 Pokes to the Screen

POKE is used to create fast moving screen displays, the protocol being POKE XXXXX,$YY, where YY is the display code of the character to appear and XXXXX is the screen address.

For this purpose, screen addresses start at 53248 at the top left hand corner and run consecutively to 54247 at the bottom right - that is 40 locations to each of the 25 screen lines.

The program below demonstrates a simple application enabling the user to move a spaceship around the screen by the use of keys 1,2,3,Q,E,ASD and to fire upwards by pressing W.

```
10  B=53248:COLOR,,7,1:PRINT"C"
20  A=B+C:IF A<53248 THEN A=B
30  IF A> 54247 THEN A=B
40  POKEB,0:POKE A,$C7:B=A
50  GET G$:IF G$="" THEN 50
60  IF G$="E" THEN C=1: GOTO 20
70  IF G$="Q" THEN C=-1: GOTO 20
80  IF G$="S" THEN C=40: GOTO 20
90  IF G$="2" THEN C=-40: GOTO 20
100 IF G$="A" THEN C=+39: GOTO 20
110 IF G$="D" THEN C=41: GOTO 20
120 IF G$="1" THEN C=-41: GOTO 20
130 IF G$="3" THEN C=-39: GOTO 20
140 IF G$="W" GOTO 160
150 GOTO 50
160 IF A<53288 THEN 50
170 FOR X=A-40 TO 53248 STEP -40
180 POKE X,$50:USR(62)
190 POKE X,0
200 NEXT X:GOTO 50
```

[C in line 10 is the CLR key]

This is a rather pedestrian way of achieving the effect, but written this way so the order is clear. Note in particular lines 20, 30 and 160 which are to prevent a POKE going accidentally to any location outside the screen which would have undesired effects, crash the program or worse!

Back to Basics

A tutorial in BASIC for new programmers

After last month's excursion into the realms of IF...THEN we now look at UNCONDITIONAL transfers.

GOTO

These differ greatly from last months CONDITIONAL transfers. As you will remember, the program BRANCHED to another section of the program dependant on the result of a question which was asked (IF?.....THEN). Unconditional transfers are used to transfer from one section of the program to another without any decision making being involved. Look closely at the following example:

```
10  INPUT  " Length "; L
20  INPUT  " Width  "; W
30  A=L*W: REM AREA = LENGTH
    *  WIDTH
40  PRINT A
50  IF A>8 THEN 80
60  PRINT "The Area is too
    small!"
70  GOTO 90
80  PRINT "This Area is
    suitable"
90  END
```

Within the program, a question is asked at line 50:

Is the area greater than 8?

Depending on the answer the program will BRANCH to another instruction.

If the answer is YES the program branches to line 80, if not, it will branch to line 60 (the next statement).

If the answer to the question is NO the program informs the user that the rectangle is too small and line 70 forces the program to jump to line 90 which ends the session.

Otherwise, the program jumps to line 80, telling the user that the rectangle is O.K. and then ends the session.

If we were to omit line 70 the program would inform the user that the rectangle was both 'too small' and 'suitable' - obviously not a good idea!

RETURNING WITHOUT A GOSUB

Taking the above example and making some small coding changes can alter the whole appearance and nature of the program.

For instance, the program listing above gives the user no opportunity to RETURN to the initial question and give a different answer.

Try changing line 90 and re-running the program.

```
10  INPUT  " Length "; L
20  INPUT  " Width  "; W
30  A=L*W: REM AREA = LENGTH
    *  WIDTH
40  PRINT A
50  IF A>8 THEN 80
60  PRINT "The Area is too
    small!"
70  GOTO 10
80  PRINT "This Area is
    suitable"
90  END
```

Effectively, this creates a loop which will continue until the area is suitable in size.

GOTOs should be used sparingly and some 'purists' would have them banned altogether.

RETURNING WITH A GOSUB

In the above example we have created a SUBROUTINE which continues asking the same questions until we get an answer that is acceptable. There is another way of looking at this problem and creating a slightly more elegant program.

```
10   GOSUB 90
20   A=L*W: REM AREA = LENGTH
     *  WIDTH
30   PRINT A
40   IF A>8 THEN 70
50   PRINT "The Area is too
     small!"
60   GOTO 10
70   PRINT "This Area is
     suitable"
80   END
90   INPUT  " Length "; L
100  INPUT  " Width  "  ; W
110  RETURN
```

The example program we have used does not show any great advantage in using the GOSUB/RETURN subroutine but for the sake of those reading your programs (including yourself!) - use subroutines wherever possible.

Next month we'll take a look at a program written using only subroutines and examine what it's doing in close detail.

Last Words on Passwords
from David Saunders

Criticism has been directed at "SHARP FOCUS", and at myself, as provider of the information for disclosing password storage addresses. I qualified it by pointing out that it was "for the initiated" and I kept it in language that only the initiated would know how to utilise. I am sure that none of my software clients would know where to start given that information.

The first serious task that I put a PC-1401, a PC-1350 and my PC-2500 to work upon was determining those positions in case some nut behind the keyboard put in a later-forgotten password! - and they have been used for solving exactly that problem. I am suggesting that any person who knows **how** to use that information would also be capable of determining **where** that information is.

An American author in an American publication is also disclosing this in memory maps. I won't tell you who or in which but, I am sure, the initiated will know.

I never use the above information now. I know where the password enable/disenable resides in my PC-2500 so I just lock it or unlock it with that. As far as the password itself goes, I have banged a string of zeroes into the relevant area and they will not work as a password so the above information is quite meaningless! And I can reset the whole machine from within my program should some smartie operate it without the password being set. It wipes out the program, telephone book and the business systems in the flick of an eyelid.

I shan't be disclosing the latter information except to very trusted operators.

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- some inside information

The magazine has been produced for current and impending Sharp users, and will naturally rely quite considerably upon contributions received from 'the field'.

We welcome submissions from all quarters, be they from novices or experienced users, and we will pay for any item published.

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We will return submissions if specifically requested to do so only if a stamped and return addressed envelope (or padded bag) of suitable proportions is provided.

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